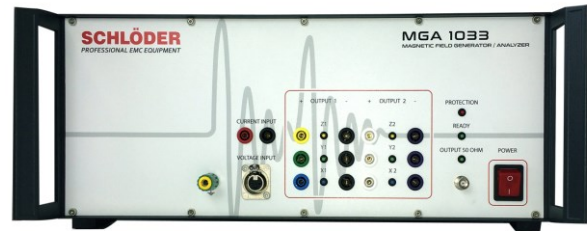


MGA 1033

Magnetic Field Generator - Analyzer

IEC / EN 61000-4-8, ISO 11452-8
MIL-STD-461, IEC / EN 55103-1/2 a. o.

- Magnetic field tests and measurement DC to 250 kHz
- Complies to all relevant EMC, automotive and military standards
- Magnetic field strength up to 1000 A/m at 1000 Hz
- Fully automated tests with optional triaxial Helmholtz coil.



With self-calibration!
Integrated spectrum analyzer!

Overview

The MGA 1033 is a compact test system for generating and measuring magnetic fields in the frequency range from DC to 250 kHz. The integrated high-power amplifier allows the high field strengths required by numerous military and automotive standards to be easily achieved.

In combination with the triaxial Helmholtz coil MGA HCST 50-28, field strengths of 1000 A/m can be generated in the frequency range from DC to 1 kHz. The test is extremely convenient: due to the triaxial design, the fields are generated fully automatically in all three spatial axes - the test object no longer needs to be rotated.

The MGA 1033 consists of three main modules:

- Signal generator (DC - 250 kHz)
- Power amplifier (800 W output power, DC - 1 MHz bandwidth)
- Spectrum analyzer (16 bit, 1 MS/s sampling rate)

All modules can be used like single units. Although originally developed for the measurement and generation of magnetic fields, the MGA 1033 can be used for a wide range of measurement and testing applications.

Key facts

- Consisting of the following modules: signal generator (DC - 250 kHz), power amplifier (800 W output power, DC - 1 MHz bandwidth) and spectrum analyzer (16 bit, 1 MS/s sampling rate)
- **Tests with magnetic field requirements for the following standards:** ISO 11452-8, MIL-STD-461, IEC/EN 55103-1/2, IEC/EN 61000-4-8, SAE J1113-2, SAE J1113-22, Ford ES-XW7T-1A278-AC, PSA B217110, Renault 36-00-808, DC-11224, DC-10614 and similar standards.
- Measurements and tests according to the following **standards** additionally implemented **in the application software:** MIL-STD-461 (CE101, CS101, CS109), EN 61000-4-16 and IEC / EN 61543
- **Application software** for Microsoft Windows with preset parameters/limit values, transfer of own routines possible, data transfer from external multimeter via serial port
- Extensive range of accessories: coils, adapters, coupling devices



MGA 1033

Magnetic Field Generator - Analyzer

Technical data

Analyzer

Voltage input (Analyzer)

| | |
|--------------------|--|
| Frequency range | DC - 250 kHz |
| Input impedance | 1 M Ω / 50 Ω switchable |
| Connector | XLR, unbalanced (1 ground, 2 +, 3-) |
| Max. input voltage | 100 V continuous (attenuator autoset at overvoltage); 10 V at 50 Ω |
| Gain | -20/0/20/40 dB preamplifier 0/20 dB ADC amplifier self-calibration with ultra stable on-board reference |

Current input

| | |
|--------------------|---|
| Frequency range | DC - 250 kHz |
| Shunts | 10 m Ω / 1 Ω / 100 Ω |
| Max. input current | 20 A continuous (overload protection) 1 Ω and 100 Ω shunt are protected additionally by an 1.5 A fuse |
| Connector | 4 mm safety jack (+, -) |
| Measurement range | 20 A, 10 A, 1 A, 100 mA, 10 mA, 1 mA automatic offset and gain self-calibration with ultra stable on-board reference |

AD-converter

| | |
|---|--|
| Resolution | 16 Bit |
| Sampling rate | 1.0 MS/s |
| Aliasing filter (filter may be switched off) | 0.01dB Tschebyscheff filter, fg = 260 kHz; |

Generator

| | |
|------------------|--|
| Frequency range | DC - 250 kHz |
| Output impedance | 50 Ω |
| Connector | BNC, unbalanced |
| Signal | sine wave / square wave / triangular / DC |
| Amplitude | 0 – 10V AC, -10V - +10V DC |
| Resolution | 12 Bit (2.5 mV) switchable -20 dB attenuator Self-calibration with ultra stable on-board reference |

Amplifier

| | |
|---|---|
| Frequency range | DC – 1 MHz |
| Connector | 4 mm safety jacks (output) BNC, unbalanced (input) |
| Current | 16 Arms |
| Voltage | 50 V _{rms} / 75 V _{DC} |
| Distortion (DC – 100 kHz, load \geq 4 Ohm) | < 0.10 % |
| Voltage amplification | 10 \pm 0.1 % (\pm 0.01 % / $^{\circ}$ C) |

General data


| | |
|---------------------------|--------------------------------------|
| EUT control / Connector | 9-pin Sub-D; RS-232 |
| Connection to computer | USB |
| Temperature range | 0 to 40 $^{\circ}$ C |
| Warm-up time | 15 min |
| Housing | 19" subrack or desktop case |
| Mains voltage | 115 / 230 VAC \pm 10%, 50-60 Hz |
| Dimensions (W x H x D) | 449 mm x 177 mm x 580 mm |
| Weight (shipping) | approx. 40 kg (net 34 kg) |



MGA 1033

Magnetic Field Generator - Analyzer

| Options | |
|---|--|
| Loop sensor/ radiating loops | Field loops are required to generate magnetic fields. Magnetic fields are measured with sensor loops. The loops are manufactured according to the definitions in MIL-STD 461 and EN 55103. |
| Helmholtz coil | Helmholtz coils are the ideal instruments for generating homogeneous magnetic fields. The models HCS 50-28 and HCST 50-28 generate field strengths from 1000 A/m to 1 kHz. The MGA 1033 with the optional compensation board is required for this. |
| Coupling transformer | A coupling transformer is used for testing for conducted immunity on power lines according to MIL-STD-461, CS 101. Due to the high common-mode voltage on the mains side, a differential amplifier is built into the coupling transformer, which enables simple measurement of the coupled differential voltage. |
| Testing equipment acc. to EN 55103-2 | Annex B of EN 55103-2 describes various test adapters intended for immunity tests from 50 Hz to 10 kHz. |

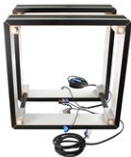



| Technical data | Options: loop sensor / radiating loops | | | |
|---------------------|---|---|---|---|
| Article | Loop sensor LS 040 | Radiating loop RL 120 (RL 120-80) | Loop sensor LS 133 | Loop sensor- / radiating loop RLS 133 |
| |  |  |  |  |
| Diameter | 40 mm | 120 mm (200 mm) | 133 mm | 133 mm |
| Shielding | elektrostatic | - | elektrostatic | elektrostatic |
| Cable connector | XLR | 4 mm MC plug | XLR | XLR / 4 mm MC plug |
| Coil factor (50 mm) | --- | 76,3 1/m | --- | 138,5 1/m |
| Correction factor | see calibration sheet (50 Ω / 600 Ω / 1MΩ) | --- | see calibration sheet (50 Ω / 600 Ω / 1 MΩ) | see calibration sheet (50 Ω / 600 Ω / 1 MΩ) |
| Rated current | --- | 16 A | --- | 5 A |
| Connection cable | microphone cable | litz wire 2 x 1.5 mm ² | microphone cable | microphone cable / litz wire 2 x 1.5 mm ² |



MGA 1033




Magnetic Field Generator - Analyzer

Technical data* Options: Helmholtz coils

| Helmholtz coils MGA | HCS 50-28 | HCS 100-60 | HCS 125-75 | HCST 50-28 |
|--|---|---|---|---|
| |  |  |  |  |
| Number of axes | 1 | 1 | 1 | 3 |
| Dimensions [cm] | 50 cm | 100 cm | 125 cm | 50 / 46 / 42 cm |
| Number of turns (per coil) | 26 + 4 | 44 + 10 | 40 + 10 | 26 + 4 |
| Coil distance [cm] | 28 | 60 | 75 | 28 |
| Coil factor [m ⁻¹] (typical) | 65.9 / 11.2 | 62.1/ 13.4 | 47.5 / 10.3 | X-axis: 66.1/11.3 Y-axis: 67.8/11.8 Z-axis: 69.1/12.2 |
| DC resistance (typical) | 0.63 / 0.15 Ω | 2.27 / 0.43 Ω | 9.8 / 2.0 Ω | X-axis: 0.58/0.10 Ω Y-axis: 0.53/0.09 Ω Z-axis: 0.48/0.08 Ω |
| Inductance (typical) | 1.73 / 0.07 mH | 15.8 / 0.65 mH | 16.4 / 1.0 mH | X-axis: 1.73/0.07 mH Y-axis: 1.52/0.06 mH Z-axis: 1.33/0.05 mH |
| Resonant frequency | > 700 kHz | > 150 kHz | > 150 kHz | > 700 kHz |
| Continuous/ short-time current | 16 / 20 A | 16 / 20 A | 5 / 7 A | 16 / 20 A |

* For further data, please refer to the technical data sheet for "Helmholtz coils"

Technical data Options: adapter, calibration network, current transducer, EN 55103-2

| Article | Common mode test adapter MGA B1 EN 55103-2 | Calibration network MGA B2 EN 55103-2 | Current transducer MGA B4 EN 55103-2 |
|------------|---|--|---|
| |  |  |  |
| Connectors | Generator in: BNC Output: XLR male | Input: XLR female Output: XLR male | Audio in: 4 mm MC safety jacket Input: XLR female Output: XLR male |



MGA 1033

Magnetic Field Generator - Analyzer

Technical data

Options: coupling transformer

*Coupling transformer MGA CT-50A
with differential amplifier*



Coupling transformer MGA CT-50A

Primary windings

| | |
|----------------------------|--|
| Inductance | ~ 4 mH (unloaded) |
| Rated current | 16 A |
| Input voltage (saturation) | 15 Hz: > 12,5 Veff 30 Hz: > 25 Veff |
| Connectors | safety panel receptacle Ø 4 mm |

Secondary windings

| | |
|--------------------------|---|
| Inductance | > 2 mH (unloaded) |
| Saturation | 50 A (AC or DC) |
| Connectors | high current plug Ø 6 mm (< 50 A) with integrated Ø 4 mm socket (< 32 A) |
| Secondary side (monitor) | 0.1 A, BNC |
| Precision resistance | 0,5 Ohm, 1%, 100 W active cooling |

Differential amplifier

| | |
|-----------------|--|
| Frequency range | DC - 700 kHz (small signal) / DC - 200 kHz (full power) |
| CMRR | > 60 dB (400 Hz) |
| Noise | < 6.5 mVrms (DC - 2 MHz) |
| Output | 20 Vpp / 10 mA |

General data

| | |
|------------------------|---|
| Frequency range | 15 Hz - 250 kHz |
| Turns ratio | 2 : 1 (step down) |
| Precision resistor | 0.5 Ohm, 1 %, 100 W, active cooling |
| Case | 19" desktop case (cabinet mounting optional) |
| Dimensions (W x H x D) | 480 mm x 180 mm x 315 mm |
| Weight | approx. 13,5 kg |



MGA 1033

Magnetic Field Generator - Analyzer

| Options | |
|----------------|---|
| MGA 1033 | Generator/analyzer for magnetic field tests/measurements according to ISO 11452-8, EN 55103-1/2, MIL-STD-461 and similar standards frequency range: DC - 250 kHz; amplifier: 50 V / 16 A; scope of delivery: power cable, USB cable, system software Windows® 8 / 10 |
| MGA 1032 | Option: compensation board for MGA 1033; for compensation of the coil inductance of MGA HCS 50-28 TAP and MGA HCST 50-28 TAP (for field strengths up to 1000 A/m up to 1000 Hz) |
| MGA LS 040 | 40 mm coil to MIL-STD-461 (RE101) ; incl. cable, 3 m |
| MGA RL 120 | 120 mm coil to MIL-STD-461 (RS101) ; incl. cable, 3 m |
| MGA LS 133 | 133 mm coil to MIL-STD-461 (RE101) ; incl. cable, 3 m |
| MGA RLS 133 | 133 mm coil according to EN 55103 ; incl. cable set |
| MGA HCS 125-75 | Helmholtz coil with centre tap; for tests according to MIL-STD-461, EN 55103-2, SAE J1113-22 and others ; frame length 125 x 125 cm, distance 75 cm; incl. cable set, 3 m |
| MGA HCS 100-60 | Helmholtz coil 1 axis 1.00 x 1.00 m, for tests according to MIL-STD-461, EN 55103-2, SAE J1113-22 and others , distance 0.60 m, incl. cable set, 3 m |
| MGA HCS 50-28 | Helmholtz coil with centre tap; for tests according to MIL-STD-461, EN 55103-2, SAE J1113-22 and others ; frame length 0.5 x 0.5m, distance 0.28 m; incl. cable set, 3 m |
| MGA HCR 50-25 | Helmholtz coil for direct current, 1-axis, for tests according to MIL-STD-461, EN 55103-2, SAE J1113-22 and others int. Ø 0.44 m, distance 0.25 m, incl. cable set, 3 m |
| MGA HCST 50-28 | Triaxial Helmholtz coil with center tap; for tests according to MIL-STD-461, EN 55103-2, SAE J1113-22 and others ; continuous current: 16 A, Size: 50 cm x 46 cm x 42 cm, incl. cable set, 3 m |
| MGA CT 50A | Coupling transformer for tests according to MIL-STD-461 / CS101 ; in connection with MGA 1033; contains resistance 0.5 Ohm / 100 W (actively cooled) and differential amplifier; Incl. power supply and cabling |
| MGA ISS-19 | Coupling device for tests according to DO-160 , Section 19 (19.3.1, 19.3.2, 19.3.3) in connection with MGA 1033; incl. power supply and cabling |
| MGA B1 | Test adapter according to EN 55103-2 |
| MGA B2 | Calibration network according to EN 55103-2 |
| MGA B4 | Current transformer with matching network according to EN 55103-2 |
| MGA SO_CE101 | Software upgrade MIL-STD-461 / CE101 |
| MGA SO_CS101 | Software upgrade MIL-STD-461 / CS101 |
| MGA SO_CS109 | Software upgrade MIL-STD-461 / CS109 |
| MGA SO_4_16 | Software upgrade EN 61000-4-16 |
| | Coupling networks & accessories for tests according to EN 61000-4-16 , please request separate data sheet! |

All information regarding appearance and technical data correspond to the current state of development at the time of release of this data sheet. We reserve the right to make technical changes. 292111

